

GENERAL NOTES

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NEWLY DISCOVERED POPULATIONS AND FOOD PLANTS EXTEND THE RANGE OF THE ENDANGERED QUINO CHECKERSPOT BUTTERFLY, *EUPHYDRYAS EDITHA QUINO* (NYMPHALIDAE) IN SOUTHERN CALIFORNIA

Additional key words: *Plantago*, *Castilleja*, *Antirrhinum*, *Cordylanthus*, Scrophulariaceae, Orobanchaceae, Veronicaceae.

The federally endangered quino checkerspot (*Euphydryas editha quino* (Behr) is restricted to the coastal slope of southwestern California. When the quino checkerspot was petitioned for listing in 1988, it was already believed extinct. However, several populations were detected in the early 1990's in southwestern Riverside County (Oak Mountain, Murrieta Hot Springs, and Temecula) and north-central San Diego County (Oak Grove). Furthermore, a year before the species was listed as endangered on January 16, 1997 (Rogers 1997), several quino checkerspots were observed on the western slopes of Otay Mountain in southwestern San Diego County. Since then, additional quino checkerspot populations have been found in southeastern (Jacumba) and south central (west Tecate Peak) San Diego County (Mattoni et al. 1997).

All of the known historical records of the quino checkerspot (i.e., captures and observations) were used to infer the elevational range and habitat associations (e.g., Mattoni et al. 1997). The historical records placed the quino checkerspot from the coast to a few high-elevation sites, including Black Star Canyon (625 m) in Orange County, Gavilan Hills (660 m) and Sage (765 m) in Riverside County, and San Miguel Mountain (660 m), western Mount Palomar (940 m), Jacumba Peak (1050 m), and Tecate Peak (1200 m) in San Diego County. These higher-elevation observations (>1000 m) were of hilltopping males on the highest peaks in the area. The food plants and butterflies were largely believed to occur well below 1000 m in the surrounding valleys. Also it was assumed that the quino checkerspot was restricted to open clay flats in the following habitats: native grasslands, coastal sage scrub, scattered juniper woodland, and chaparral.

Intensive and extensive quino checkerspot surveys (>1300 man hours) were conducted during the 1998 spring flight season to document presence/absence, relative abundance, and distribution of the butterfly in Orange, Riverside, Los Angeles, and San Diego Counties. Because most of the known records of the species were below 1000 m, with higher-elevation records representing hilltopping males, surveys were concentrated below this elevation. A number of new sites for the species were documented, but all within its recog-

nized elevational (100–1000 m) range (GFP & EWH pers. obs., McMillan pers. com.). Many of the occupied sites support the larval host plant *Plantago erecta* Morris (Veronicaceae), and a suspected alternate host plant, *Castilleja exserta* (A. A. Heller) Chuang & Heckard (Orobanchaceae) (see Olmstead et al. 2001 for new plant families). Similar to *E. e. editha* (Boisduval) (formerly *E. e. bayensis*), we believed these two plants and other Veronicaceae and Orobanchaceae might be important for population survival of the quino checkerspot (Singer 1971, 1972).

East of Aguanga, the elevations of the valleys rapidly climb above 1000 m. For this reason, the area had not been surveyed during much of the quino checkerspot flight season. However, *Castilleja exserta* was observed in early May 1998 growing abundantly throughout an area east of Aguanga and south of Anza, well above 1000 m (M. Shaughnessy pers.). One of us (GFP) surveyed the area on 20 May 1998, to determine the suitability of habitat and the likelihood of quino occupancy. During the survey, two male quino were collected, one south of Anza near 1200 m and the other east of Iron Springs Mountain at approximately 1500 m elevation (Fig. 1). Both specimens have been placed as vouchers in the Entomology Research Museum at the University of California, Riverside, CA. These checkerspots were a significant eastward range and elevational extension for the species; even the valleys in this area were largely above 1200 m elevation. Other new populations, including additional sites in the Anza area, have extended the range of quino checkerspot populations (Fig. 1).

The habitat for both the south of Anza and Iron Springs Mountains sites were largely red shank (*Adenostoma sparsifolium* Torr., Rosaceae) chaparral, with other scattered chaparral bushes such as oaks (*Quercus* sp., Fagaceae), mountain mahogany (*Cercocarpus betuloides* Nutt. ex T. & G., Rosaceae), and buckthorns (*Ceanothus* sp., Rhamnaceae). Interestingly, no *Plantago* species was observed within several hundred m of either of these sites. Instead *Antirrhinum coulterianum* Benth. in DC. (Veronicaceae) was found common at the south of Anza site, and *Collinsia concolor* Greene (Veronicaceae) and

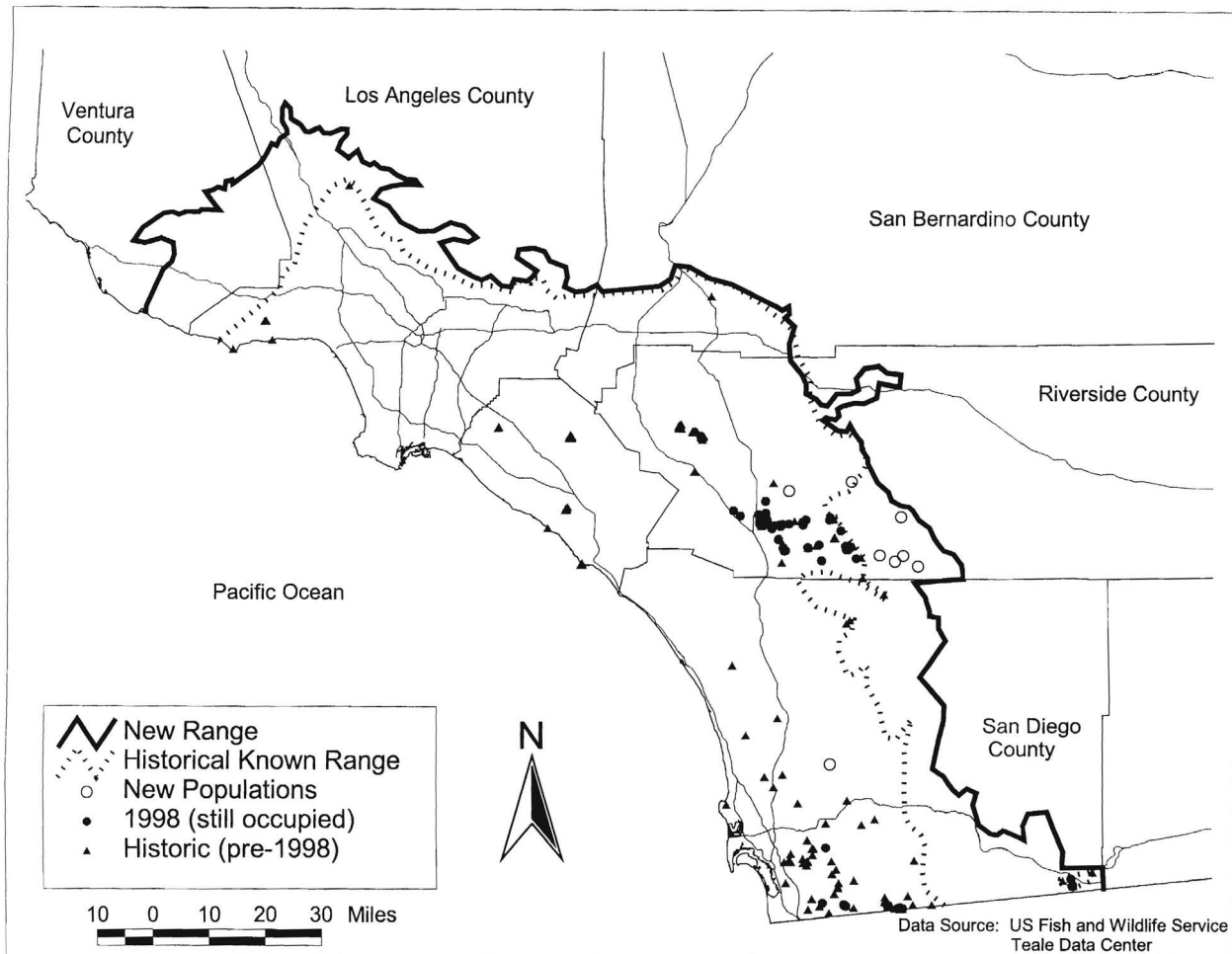


FIG. 1. New populations and inferred range of the quino checkerspot butterfly (*Euphydryas editha quino*) in southern California. The range extension was extrapolated from the higher elevation sites found near Anza, California.

Castilleja exserta were detected at the Iron Springs Mountain site. These three plants support larval development of the quino checkerspot to the adult in the laboratory (GFP unpubl. data). Furthermore, *Collinsia* spp. and *Castilleja* spp. are larval food plants for other *Euphydryas editha* subspecies (Singer 1971, 1972, 1982, White 1974, Garth & Tilden 1986).

Additional quino checkerspot adults and larval clusters were observed at and between the south of Anza and east of Iron Springs Mountain sites during the springs of 2000 and 2001. A single interconnecting silken shelter with 40 to as many as a couple of hundred first and/or second instar larvae was used to identify a single larval cluster. Between 11 April and 9 May, 2000, 39 males and five females were observed and between 3 and 18 May, 2000, 54 prediapause larval clusters were found on *Plantago patagonica* Greene (Veronicaeae) (GFP pers. obs.). From 24 April to 16

May, 2001, an additional 40 males and six females were observed, while between 9 and 28 May, 2001, 134 larval clusters were observed on *Antirrhinum coulterianum* and none on *Plantago patagonica*, even though thousands of *Plantago* were searched (GFP pers. obs.).

We believe these new populations are not a new *Euphydryas editha* subspecies. They are similar in color pattern and size to other quino checkerspot populations. Although prediapause larvae from this new population fed on a new food plant *Antirrhinum coulterianum* in 2001 (which suggested a new *Euphydryas editha* subspecies), in 2000 they fed on *Plantago patagonica*, the same genus as the major quino checkerspot food plant. Other quino checkerspot populations were observed to use even more divergent food plants. For instance larval clusters were found on the western and northern slopes of Tecate Peak of southern San Diego County on *Cordy-*

lanthus rigidus (Benth.) Jeps. (Orobanchaceae) (also a new food plant for the species) and *Plantago erecta* during the springs of 1999 and 2001 (GFP pers. obs.). Recent molecular studies suggest these food plants (*Cordylanthus* and *Plantago*) are more distantly related (separate families) than are *Antirrhinum* and *Plantago* (same family) (Olmstead et al. 2001). The food plant therefore may not be the most important character used to distinguish *Euphydryas editha* sub-species.

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PRECEDENCE OF *CATOCALA LOUISEAE* BAUER, 1965 AS A NOMEN PROTECTUM OVER *CATOCALA PROTONYMPHA* BOISDUVAL, 1840 (NOCTUIDAE)

ABSTRACT. The name *Catocala protonympha* Boisduval has heretofore been considered a junior synonym of the Palearctic species *Catocala fulminea* Scopoli. Examination of Boisduval's type and relevant literature demonstrates that *Catocala protonympha* is in fact a disused senior synonym of the Nearctic species *Catocala louiseae* Bauer. Article 23.9.2 of the Code is invoked to give precedence to the established name *Catocala louiseae*, and maintain nomenclatural stability in the genus.

Additional key words: taxonomy, synonymy, types, Boisduval, Guenée, Staudinger, Culot.

In 1840, J. A. Boisduval described a new species of *Catocala* Schrank (1802) as *Catocala protonympha*, as follows: "Species distinctissima antennis crassioribus dentatis; statura *Callinympha*; alae posticae fere ut apud jam dictam; anticae cinereo-fuscae fasciis vix angulosis" [A species very distinct, by thick dentate antennae; size of *callinympha*; hindwings about the same as with those I have already described; forewings ash grey-brown with bands slightly angled]. The type locality was listed as "P." [=Paris, France].

Guenée (1852:103) figured *protonympha* on his Plate 15, Fig. 2, comparing it to *Catocala paranympha* L., which is a synonym of the widespread Palearctic species *Catocala fulminea* (Scopoli 1763), and stated "Environs de Paris, en aout. Coll. Bdv. Un ♂" [vicinity of Paris, in August. Collection of Boisduval. One male].

Guenée's original illustration of *Catocala protonympha* is reproduced here in Fig. 1c. Guenée also remarked on the apparent extraordinary rarity of *protonympha*: "C'est jusqu'ici, une des plus grandes raretés. Pourtant, M. Begrand m'a affirme avoir vu, sur un mur, au bois de Boulogne, une certaine quantité de petites *Catocala* jaunes qui ne pouvaient appartenir qu'à cette espèce, la *paranympha*, avec laquelle la confusion est impossible" [Up to now, it is one of the great rarities. However, Mr. Begrand is positive about having seen a certain number of small yellow *Catocala* on a wall in the Boulogne woods, they necessarily belonged to the species *paranympha* with which no confusion is possible].

Subsequently, *Catocala protonympha* was listed with questionable provenience by Berce (1870:242): "est regardée comme douteuse par beaucoup de lépi-